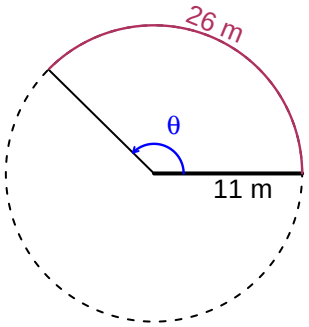
Name: Date:

Trig Final (Practice v1)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The radius is 11 meters. The arc length is 26 meters. What is the angle measure in radians?

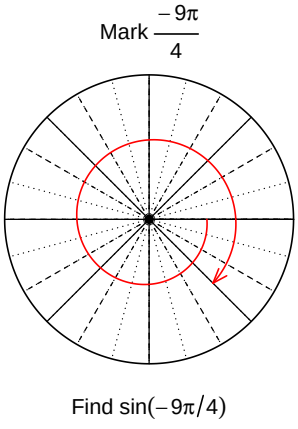


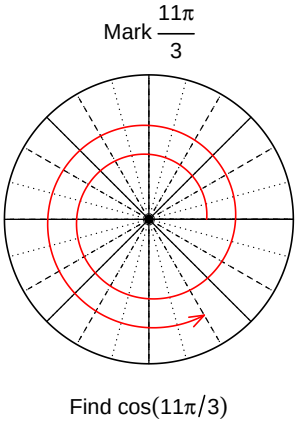
$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

$\theta = 2.364$ radians.

Question 2

Consider angles $\frac{-9\pi}{4}$ and $\frac{11\pi}{3}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\sin\left(\frac{-9\pi}{4}\right)$ and $\cos\left(\frac{11\pi}{3}\right)$ by using a unit circle (provided separately).





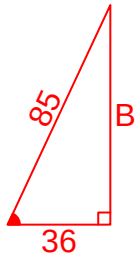
$\sin(-9\pi/4) = \frac{-\sqrt{2}}{2}$

$\cos(11\pi/3) = \frac{1}{2}$

Question 3

If $\cos(\theta) = \frac{-36}{85}$, and θ is in quadrant II, determine an exact value for $\sin(\theta)$.

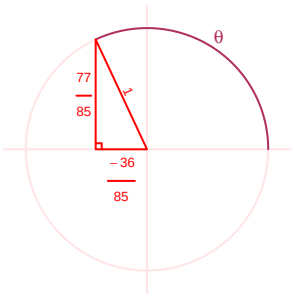
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$36^2 + B^2 = 85^2$$
$$B = \sqrt{85^2 - 36^2}$$
$$B = 77$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant II in a unit circle.



$$\sin(\theta) = \frac{77}{85}$$

Question 4

A mass-spring system oscillates vertically with an amplitude of 6.72 meters, a frequency of 3.44 Hz, and a midline at $y = 5.51$ meters. At $t = 0$, the mass is at the midline and moving up. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 6.72\sin(2\pi 3.44t) + 5.51$$

or

$$y = 6.72\sin(6.88\pi t) + 5.51$$

or

$$y = 6.72\sin(21.61t) + 5.51$$